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SUBJECT: Forwards confirmatory action response validation insp for RAI re item 3, "36 Hour Cooldown.

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INDIANA MICHIGAN POWER

January 29, 1998

AEP:NRC:1260G8

Docket Nos.: 50-315
50-316

U.S. Nuclear Regulatory Commission
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Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
CONFIRMATORY ACTION RESPONSE VALIDATION INSPECTION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING ITEM 3, "36 HOUR COOLDOWN"

During the time period January 9, 1998, through January 23, 1998, the NRC conducted a confirmatory action letter (CAL) followup inspection. During the exit meeting for the inspection, on January 26, 1998, we were requested to docket additional information regarding CAL item 3, involving the ability of the plant to be cooled down in 36 hours.

Attachment 1 to this letter contains the information requested. Attachment 2 contains a flow chart depicting the information in attachment 1.

Sincerely,

E. E. Fitzpatrick

E. E. Fitzpatrick
Vice President

/vlb

Attachments

c: J. A. Abramson
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MDEQ - DW & RPD
NRC Resident Inspector
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IE36

ATTACHMENT 1 TO AEP:NRC:1260G8

ADDITIONAL INFORMATION RELATED TO 36 HOUR COOLDOWN
CONFIRMATORY ACTION LETTER ITEM 3

Introduction

Item 3 of the confirmatory action letter (CAL) dealt specifically with the 36 hour cooldown. During the CAL validation inspection, several concerns were raised by the NRC relating to this issue. This letter is provided to assist with the characterization of those concerns.

Background

From August 4, 1997, through September 12, 1997, the NRC conducted an architect engineering (AE) inspection at Cook Nuclear Plant. During that inspection, several deficiencies were identified related to the component cooling water (CCW) system. Two such deficiencies were:

1. the 36 hour cooldown analysis completed by Westinghouse for Cook Nuclear Plant contained errors, and

2. no maximum cooling flow limits existed to protect the components cooled by CCW from high, potentially damaging flow rates. Subsequently, concurrent efforts were undertaken to correct the cooldown analysis and establish maximum flow limits.

On August 29, 1997, condition report (CR) 97-2378 was written to capture the AE inspector's concern that maximum flow limits for the CCW system did not exist. The condition report investigation was completed on December 20, 1997. As part of that investigation, technical reviews were completed that established an upper flow limit for each of the components cooled by the CCW system. A commitment was made in that CR response to incorporate the upper flow limits into the updated final safety analysis report (UFSAR). The due date for that commitment is April 1999. The April 1999 date corresponds to the next planned revision of the UFSAR. As part of the process of updating the UFSAR, a 10 CFR 50.59 evaluation is performed.

On September 19, 1997, the NRC issued a CAL to Cook Nuclear Plant. The CAL detailed eight specific items that require resolution prior to restart, one of which is the 36 hour cooldown issue. In our letter AEP:NRC:1260G3, dated December 2, 1997, we provided our CAL response to the NRC. From January 9, 1998, to January 23, 1998, the NRC conducted a CAL validation inspection to review and verify the CAL response.

Discussion

During the validation inspection, the NRC reviewed CAL Item 3, 36 hour cooldown. The review was two-fold. First, the NRC reviewed the actual plant cooldown calculation completed by Westinghouse, as well as the supporting documentation that had been compiled by both us and Westinghouse. That documentation included Westinghouse's safety evaluation check list (SECL) 97-189, and our 10 CFR 50.59 evaluation completed for the 36 hour cooldown. It was determined that, during a 36 hour cooldown, the CCW supply temperature may exceed the previously analyzed 95° F and reach a maximum of 120° F. As part of design change 12-DCP-855, the necessary technical reviews and plant modifications were completed to allow the CCW

supply temperature to reach 120° F. In this letter, the 10 CFR 50.59 evaluation that was completed for 12-DCP-855 is referred to as the 36 hour cooldown safety evaluation.

Upon reviewing the Westinghouse cooldown calculation, the NRC questioned two of the inputs used in the analysis. One question dealt with the total CCW flow. In the analysis, the total CCW flow rate was 8,000 gpm (i.e., 4.0E6 lb./hr.). This value was taken directly from table 9.5-3 of the UFSAR. The NRC expressed concern that there was no margin between the analysis input value and the UFSAR value. To address the concern, a 10 CFR 50.59 evaluation was expedited to revise the UFSAR to allow 9,000 gpm of total CCW flow through a single CCW heat exchanger. As discussed above, the need for this 10 CFR 50.59 review had already been recognized and committed to as part of the investigation of CR 97-2378. It is important to recognize that the analysis input of 8,000 gpm was taken directly from the UFSAR and that the 9,000 gpm value is to be added to the UFSAR to show that margin exists in the cooldown analysis.

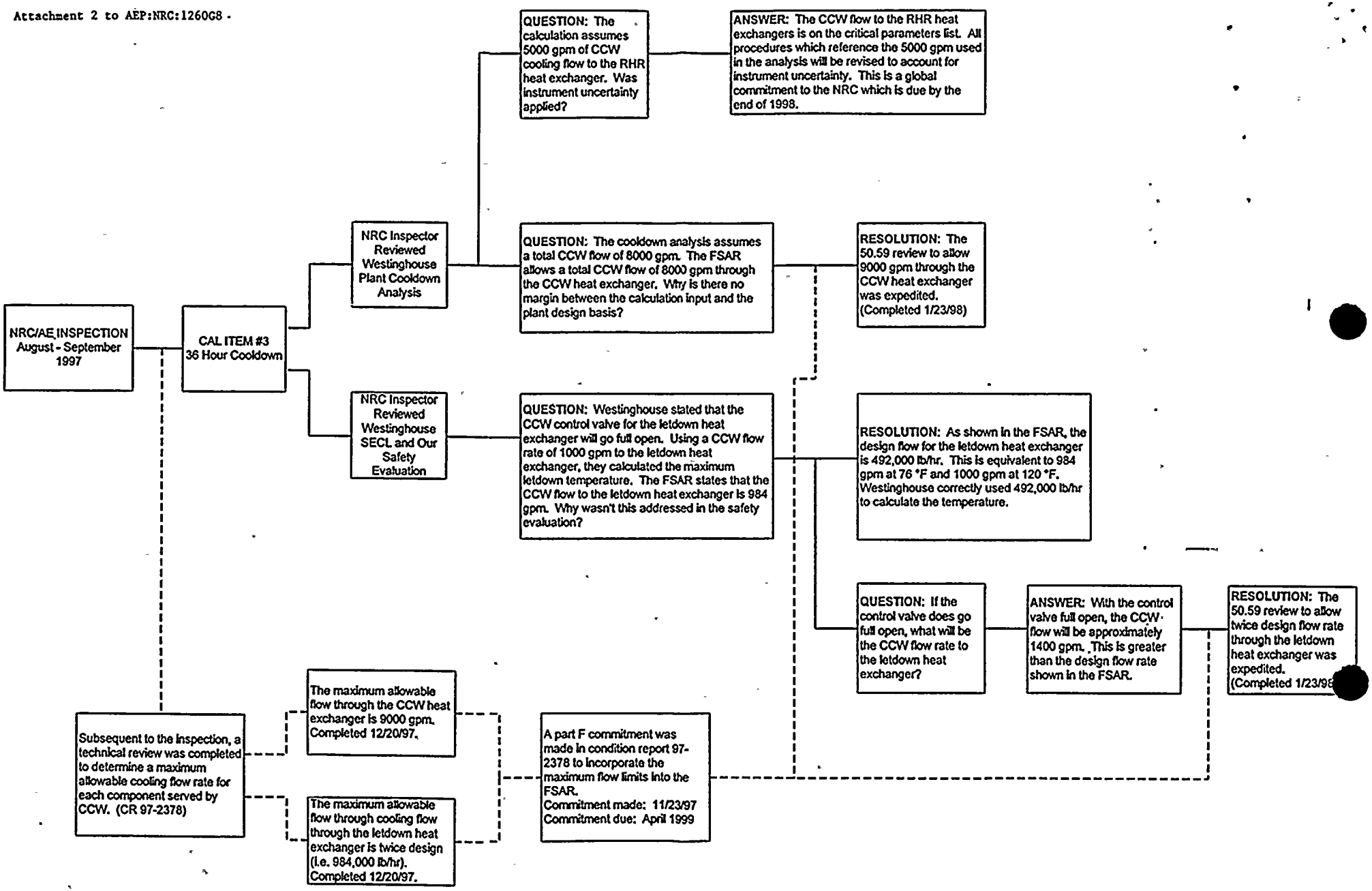
Another question dealt with the CCW cooling flow to the residual heat removal (RHR) heat exchangers. This value was 5,000 gpm in the cooldown analysis. The NRC inquired whether instrument uncertainty had been applied to the flow value. The NRC commented that at other plants it was not uncommon to see a flow uncertainty on the order of 1,000 gpm. To address the concern, we provided the NRC with information showing that the uncertainty in the flow indication loop was only on the order of ±200 gpm. Additionally, the CCW flow to the RHR heat exchanger is on our critical parameters list. Per a previous commitment made to the NRC in our letter AEP:NRC:1260G3, dated December 2, 1997, instrument uncertainty will be incorporated into the operating procedures for each value on the critical parameters list. This commitment has a due date of December 31, 1998. Thus, the issue about uncertainty in the CCW cooling flow rate to the RHR heat exchangers is already scheduled to be addressed under a previous commitment to the NRC.

In addition to reviewing the actual cooldown calculation, the NRC also reviewed the supporting documentation. Included in that documentation was SECL 97-189 completed by Westinghouse to support operation of the CCW system at the elevated supply temperature of 120° F. In their SECL, Westinghouse stated the control valve regulating the CCW flow to the letdown heat exchanger will go full open during a 36 hour cooldown. The NRC noted that Westinghouse assumed, with the valve full open, a total CCW flow of 1,000 gpm through the letdown heat exchanger. The inspector pointed out that table 9.5-2 of the UFSAR lists the design CCW flow to the letdown heat exchanger as 984 gpm and questioned why the apparent discrepancy was not called out in the safety review. The following explanation was provided. The actual design cooling flow rate for the letdown heat exchanger is 492,000 lb./hr. - a mass flow rate, not a volumetric flow rate. This is shown in table 9.2-3 of the UFSAR. The flow rate of 984 gpm, as shown in table 9.5-2 of the UFSAR, is the volumetric flow rate that corresponds to 492,000 lb./hr. at standard conditions. The flow rate of 1,000 gpm, as shown in the SECL, is the volumetric flow rate that corresponds to 492,000 lb./hr. at the CCW return temperature expected during a 36 hour cooldown. Thus, the volumetric flow rates of 984 gpm and 1,000 gpm are both correct as they are both derived from the design mass flow rate specified for the letdown heat exchanger.

As a follow up question to the one above, the NRC asked how much CCW flow is expected to pass through the letdown heat exchanger with the control valve full open. A preliminary calculation determined with the control valve full open, approximately 1,400 gpm would pass through the letdown heat exchanger. The NRC further questioned why the flow rate, which is greater than the value listed in the UFSAR, was not evaluated in the 36 hour cooldown safety evaluation. To address the immediate concern, a 10 CFR 50.59 evaluation was expedited to evaluate twice the design cooling flow rate through the letdown heat exchanger (approximately 2,000 gpm). As discussed above, the need for this 10 CFR 50.59 review had already been recognized and committed to as part of the investigation of CR 97-2378. Although the letdown heat exchanger cooling flow rate of 1,400 gpm was not specifically addressed in the 36 hour cooldown safety review, a bounding analysis had been completed and a commitment to revise the UFSAR already existed. It is important to recognize that, although the increased CCW flow rate to the letdown heat exchanger is a consequence of the higher CCW supply temperature, it is not an input in the cooldown analysis.

ATTACHMENT 2 TO AEP:NRC:1280G8

FLOW CHART DEPICTING INFORMATION PROVIDED
IN ATTACHMENT 1


NRC/AE INSPECTION
August - September 1997
CAL ITEM #3
36 Hour Cooldown
NRC Inspector Reviewed Westinghouse Plant Cooldown Analysis
NRC Inspector Reviewed Westinghouse SECL and Our Safety Evaluation
QUESTION: The calculation assumes 5000 gpm of CCW cooling flow to the RHR heat exchanger. Was instrument uncertainty applied?
ANSWER: The CCW flow to the RHR heat exchangers is on the critical parameters list. All procedures which reference the 5000 gpm used in the analysis will be revised to account for instrument uncertainty. This is a global commitment to the NRC which is due by the end of 1998.
QUESTION: The cooldown analysis assumes a total CCW flow of 8000 gpm. The FSAR allows a total CCW flow of 8000 gpm through the CCW heat exchanger. Why is there no margin between the calculation input and the plant design basis?
RESOLUTION: The 50.59 review to allow 9000 gpm through the CCW heat exchanger was expedited. (Completed 1/23/98)
QUESTION: Westinghouse stated that the CCW control valve for the letdown heat exchanger will go full open. Using a CCW flow rate of 1000 gpm to the letdown heat exchanger, they calculated the maximum letdown temperature. The FSAR states that the CCW flow to the letdown heat exchanger is 984 gpm. Why wasn't this addressed in the safety evaluation?
RESOLUTION: As shown in the FSAR, the design flow for the letdown heat exchanger is 492,000 lb/hr. This is equivalent to 984 gpm at 76 °F and 1000 gpm at 120 °F. Westinghouse correctly used 492,000 lb/hr to calculate the temperature.
QUESTION: If the control valve does go full open, what will be the CCW flow rate to the letdown heat exchanger?
ANSWER: With the control valve full open, the CCW flow will be approximately 1400 gpm. This is greater than the design flow rate shown in the FSAR.
RESOLUTION: The 50.59 review to allow twice design flow rate through the letdown heat exchanger was expedited. (Completed 1/23/98)
Subsequent to the inspection, a technical review was completed to determine a maximum allowable cooling flow rate for each component served by CCW. (CR 97-2378)
The maximum allowable flow through the CCW heat exchanger is 9000 gpm. Completed 12/20/97.
The maximum allowable flow through cooling flow through the letdown heat exchanger is twice design (i.e. 984,000 lb/hr). Completed 12/20/97.
A part F commitment was made in condition report 97-2378 to incorporate the maximum flow limits into the FSAR.
Commitment made: 11/23/97
Commitment due: April 1999